THE PENDING CLAIMS:

1. (Original) A method for activating an implanted dopant in a semiconductor substrate in a processing chamber to form shallow junctions, the method comprising:

providing a flow of a carrier gas into the processing chamber and maintaining gas pressure in the processing chamber below 900 Torr;

heating the substrate to a peak temperature above 1000°C; and

cooling the substrate at a rate sufficient to provide a residence time less than 1.6 seconds, wherein the residence time is defined as exposure of the substrate to a temperature within 50°C of the peak temperature.

2. (Original) The method of claim 1, wherein the peak temperature is 1050°C.

3. (Original) The method of claim 1, wherein the implanted dopant is boron.

4. (Original) The method of claim 1, wherein the substrate is heated at a rate of at least 180°C/second.

5. (Original) The method of claim 1, wherein the gas pressure in the chamber is in the range of 5-100 Torr.

6. (Original) The method of claim 1, wherein the residence time is at most 0.9 seconds.

7. (Original) The method of claim 1, wherein the substrate is cooled at a rate of 90°C/second.

8. (Original) A method for activating implanted boron in a semiconductor substrate in a processing chamber to form shallow junctions, the method comprising:

providing a flow of a carrier gas into the processing chamber and maintaining gas pressure in the processing chamber below about 300 Torr;

heating the substrate at a rate of at least 180°C/second to a peak temperature above 1000°C; and

cooling the substrate at a rate sufficient to provide a residence time of at most 0.9 seconds, wherein the residence time is defined as exposure of the substrate to a temperature within 50°C of the peak temperature.

9. (Original) The method of claim 8, wherein the peak temperature is 1050°C.

10. (Original) The method of claim 9, wherein the carrier gas is mixed with oxygen and the gas pressure in the chamber is in the range of 5-100 Torr.

11. (Original) The method of claim 10, wherein the oxygen reaches a level in the range of 10000-15000 ppm before the substrate reaches the peak temperature.

12. (Original) The method of claim 11, wherein the substrate is cooled at a rate of 90°C/second.

13. (Original) The method of claim 12, wherein the substrate is heated at a rate of 250°C/second.

14. (Original) A shallow junction formed in a semiconductor substrate by a method comprising:

providing a flow of a carrier gas into the processing chamber and maintaining gas pressure in the processing chamber below 900 Torr;

heating the substrate to a peak temperature above 1000°C; and

cooling the substrate at a rate sufficient to provide a residence time less than 1.6 seconds, wherein the residence time is defined as exposure of the substrate to a temperature within 50°C of the peak temperature.

15. (Original) The shallow junction of claim 14, wherein the peak temperature is 1050°C.

16. (Original) The shallow junction of claim 15 wherein the implanted dopant is boron.

17. (Original) The shallow junction of claim 16, wherein the substrate is heated at a rate of at least 180°C/second.

18. (Original) The shallow junction of claim 17, wherein the substrate is cooled at a rate of 90°C/second.

19. (Original) The shallow junction of claim 18, wherein the substrate was amorphised with germanium prior to implanting the boron.

20. (Original) The shallow junction of claim 19, wherein the shallow junction has an intrinsic diffusion length less than 4 nm.